

## Socio-Economic Benefits of Renewable Energy

A Joint Workshop of IRENA, GIZ and RCREEE  
At the World Future Energy Summit 2016

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Date: 20 January 2016  
Time: 14:00 – 18:00  
Location: Capital Suite 15  
Abu Dhabi National Exhibition Center  
Abu Dhabi, United Arab Emirates

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The business case for renewable energy is further strengthened by the socio-economic benefits they offer. These benefits are increasingly relevant for countries exploring ways to stimulate growth while reducing the adverse impacts of climate change, improving energy security and widening access to energy. The knowledge base, however, on this aspect remains relatively limited and dispersed.

Over the years, IRENA has contributed to bridging the knowledge gap by consistently building on its analysis of socio-economic benefits of large scale renewable energy deployment. In addition to the review of jobs in the renewable energy sector that is published each year, IRENA has conducted a quantitative assessment that estimates the broader macro-economic impacts of renewable energy on variables such as GDP, total employment in the economy, trade and welfare in the report *Renewable Energy Benefits: Measuring the Economics* that will be launched at the sixth IRENA General Assembly. In addition, recognising the potential areas of domestic value creation that can be achieved through renewable energy deployment, IRENA studied the different activities, sub activities and components that are needed for the deployment of selected solar and wind technologies in the study *Renewable Energy Benefits: Leveraging Local Industries*. This analysis can enable the formulation of policy recommendations on how to maximize the benefits of the deployment of these technologies.

In the context of energy access, the deployment of decentralized renewable energy can have a significant impact on communities that depend on agriculture, directly or indirectly, for their livelihoods. In the pre harvesting stage, pumping using renewable energy can displace existing fossil-fuel based systems and expand irrigation in a manner that is environmentally sustainable and maximizes resource efficiency. Renewables can also be used in post harvesting activities for heating/cooling and motive power applications for food processing and preservation, maximizing the productivity and profitability of activities including crop drying, milling, pressing, cooking and refrigeration. Building on its earlier work on *Renewable Energy in the Water, Energy and Food Nexus* and *Renewable Energy Jobs & Access*, IRENA is continuing its efforts to promote an integrated approach to decentralized renewable energy deployment through case

studies on the impacts of off-grid technologies on individuals and small enterprises in the agriculture sector.

Increasingly, on the ground projects by different institutions specifically look to promote socio-economic benefits. The German Society for International Cooperation (GIZ), for example, is implementing the regional project RE-ACTIVATE (“Promoting employment through renewable energy and energy efficiency in the Middle East and North Africa”) since 2014, on behalf of the German Ministry for Economic Cooperation and Development (BMZ). The project has been supporting the partner countries in the MENA region, particularly Morocco, Tunisia and Egypt, in making targeted use of the socio-economic effects of sustainable energies. It focuses on labor-intensive applications, in particular decentralised renewable energy generation (photovoltaics, solar thermal and wind), and energy efficiency in buildings, industry and agriculture. The project supports the partners in identifying the employment effects of different applications and in further developing their policy approaches in this respect. It facilitates the development of suitable framework conditions and adapted support instruments and helps to build skills at the local level. Successful examples are documented and fed into national and regional dialogues. The project cooperates intensively with the Regional Centre of Renewable Energy and Energy Efficiency (RCREEE) in Cairo to encourage and promote cross-border network building, know-how exchange, stakeholder cooperation and capacity development in these various respects.

In this context, a key role accrues to SE4JOBS (“Sustainable Energy for Jobs”), a collaborative measure and work platform that is supported by a number of GIZ projects and coordinated by RE-ACTIVATE. It identifies and assesses good practices and success models in connection with optimising the socio-economic effects of sustainable energies in developing countries and emerging economies. Results and recommendations are made available to a wider audience through a SE4JOBS toolbox, SE4JOBS case studies and SE4JOBS training measures which are currently in the process of finalisation.

In an effort to bridge the existing knowledge gap on the socio-economic benefits of renewable energy, IRENA has partnered with GIZ and RCREEE to present and discuss the results of the various assessments that have been conducted in this respect, revisit the approaches and trajectories which concrete global front-running countries have followed, and explore the policies and conditions needed to maximise the multiple renewable energy benefits for local populations.

**The objectives of this workshop were to:**

- Provide knowledge on the results of studies conducted to assess the impacts of renewable energy deployment on GDP and jobs;
- Share experiences, disseminate best practices and stimulate dialogues on effective policies that can maximise the socio-economic benefits of renewable energy;
- Produce insights and recommendations that help decision makers and practitioners to harness renewable energy more effectively for local socio-economic development.



## Minutes

The workshop opened with welcome remarks from Rabia Ferroukhi, Head of the Policy Unit and Deputy Director of KPFC at IRENA and Steffen Erdle from GIZ. Ferroukhi and Erdle welcomed the participants and stressed on the importance of the topic today, as the world faces the great energy challenge of meeting the demand growth of a fast-growing world. Ferroukhi stressed that decisions made today on energy sector investments have long-lasting implications. For many reasons, policy makers are increasingly seeking energy supply options that are cost-effective, secure, environmentally sustainable, and socio-economically beneficial. Renewable energy is a key part of the solution. It can contribute to the long-term resilience of the global energy system, which underpins truly sustainable socio-economic development. Recent global agreements on climate policy and sustainable development confirm the emerging consensus on renewables, as do the 164 renewable energy targets that have been set to date by countries around the world. As countries step up efforts in this direction, a better understanding of the wider socio-economic impact is required to support informed decision-making. Ferroukhi added that IRENA has been adding to this body of knowledge since 2011 through the work on jobs and broader socio-economic impacts, such as the study *Renewable Energy Benefits: Measuring the Economics* that was launched a couple of days earlier at IRENA's General Assembly. Ferroukhi continued to moderate the first session on *Benefits of Renewable Energy: Measuring the Economics* where Arslan Khalid and Alvaro Lopez-Peña presented IRENA's latest studies on the topic.

### Session 1 Benefits of Renewable Energy: Measuring the Economics

#### Renewable energy jobs, Arslan Khalid, IRENA

Khalid presented IRENA's latest study on renewable energy jobs. He stated that the sector has become a major employer, supporting around 7.7 million direct and indirect jobs in 2014, up 18% from the number reported the year before (6.5 million). The jobs are concentrated in China (largest employer with more than 40% of total jobs), Brazil (second largest employer where most jobs remain in biofuels but employment in wind energy is increasing), the United States (led by solar and biofuels with an increase in wind more than 40% following a rough patch), India and Germany. RE Employment in the EU stood at 1.2 million in 2013, and Germany and France were the key employers in this context.



Khalid emphasised that the shift to emerging and developing countries in general, and to Asia in particular, has continued, indicated by the fact that the global top ten countries now feature five in Asia, as opposed to just three in the previous year. Emerging markets include solar PV in

Japan, solar home systems in Bangladesh, biofuels in Indonesia. He said that though renewable energy employment remains relatively low in Africa, countries such as South Africa, Morocco and Kenya are increasingly creating jobs. Latin America is also ramping up renewable energy employment, where countries like Mexico, Colombia and Chile feature particularly impressive growth rates as of late.

Khalid stated that as renewables become increasingly cost competitive, the deployment rate is increasing and so is job creation. Jobs in solar PV account for 2.5 million in 2014, mostly in installation, spurred by demand growth in China, Japan and United States. Wind employment has been rising steadily, crossing the 1 million mark in 2014, with China accounting for half of these jobs. Biofuels, biomass and biogas are also major employers, with jobs concentrated in the feedstock supply. While Brazil and the United States continue to dominate, Southeast Asia is seeing strong growth in biofuel jobs, reflecting measures to support production. Solar water heating is another major employer, with more than three-quarters of the effects in China, India, Brazil and the European Union. Small hydropower is also adding jobs, more than half of which are in China, followed by the European Union, Brazil and India.

Khalid said that project level data indicate that solar PV creates at least twice the number of jobs per unit of electricity generation compared with coal or natural gas. While China is the largest employer thanks to strong domestic deployment and a thriving manufacturing industry, jobs in solar in the US have also increased by 20%. He stressed on the importance of the potential of PV applications in energy access that is best illustrated by the case of Bangladesh's solar home system program that has resulted in the installation of around 3.8 million units. An estimated 115,000 jobs have been created. An additional 50,000 jobs have been induced in the downstream industries with the availability of electricity provided by the SHS.

#### Measuring renewable energy benefits, Alvaro Lopez-Peña, IRENA

Lopez-Peña presented the results of the latest IRENA study on the socio-economic impacts of renewable energy deployment, the results of which show that doubling the share of renewables in the energy mix by 2030 would substantially increase global GDP, improve welfare and support jobs in the sector.

He stated that global GDP could increase by up to 1.1% or USD 1.3 trillion [If electricity-intensive then, 0.6%, or USD 700 billion]. The increased investment in renewable energy deployment triggers ripple effects throughout the economy. Depending on the level of ambition, he said, the positive impacts on GDP vary between countries. Notable positive impacts include Japan (+3.6%, large increase in PV, and decrease in fossil fuel imports), India (+2.4%, same as Japan), South Africa (+2.2%), the United States (+1.8%) and Australia (+1.7%).

Lopez-Peña stated that improvements in welfare would go far beyond gains in GDP and that doubling the share of renewables by 2030 has a positive impact on global welfare, which increases by up to 3.7% (1.1% improvement in GDP).

Doubling the share of renewables increases employment to 24.4 million by 2030, compared to over 9 million today. Jobs increase in all technologies. Solar, bioenergy, and hydropower remain the dominant sources of jobs. Construction and installation, and feedstock supply generate the

most jobs followed by manufacturing and O&M. With ambitious targets, India (5.8) and Japan see greatest increases in jobs growth.

As economies expand and become more interconnected, volume of global trade will increase by 2030. Doubling the share of renewables will reduce fossil fuel trade and increase trade in renewables equipment and other investment goods and services (e.g. engineering services, steels, cables). This brings new market opportunities, including for today's fossil fuel exporters.

Lopez-Peña concluded by stating that realising all these benefits requires an enabling environment for renewables development. Governments need to introduce deployment policies that trigger investments, and broader policies that can support the development of the sector (e.g. building institutional and human capacity, creating investment-friendly climate, strengthening domestic industry, etc.). He said that to ensure that we make the right investment decisions today and that we do not get locked into unsustainable energy systems, we need more empirical evidence. IRENA's Renewable Energy Benefits: Measuring the Economics is an important milestone in that direction.

#### Q&A Session with the participants

Participants of the workshop had questions to the presenters concerning how the results compare with other studies, namely that of Daniel Kammen from the University of California, Berkeley. Khalid and Lopez-Peña clarified that different employment factors are used for different countries depending on their productivity factors that are directly linked to the level of development of the sector. As such, it is not surprising that a MW of installed capacity in Lebanon is expected to create more jobs than a MW installed in another country with higher productivity levels and therefore lower capacity factors.

Another issue that was raised was the lack of information on the jobs in Africa. That is largely due to the lack of data for that region, as well as for many other regions around the world. Finally, a question was raised about the difference in job creation between different technologies. PV has been reported to create more jobs than wind, mostly due to the job-intensity of the installation and maintenance and operation of a PV plant, but also due to the increasing cost-competitiveness of the technology that has led to higher installations.

#### **Session 2 Benefits of Renewable Energy: Options for Maximising Local Value and Employment**

The second session was moderated by Ziad Jaber, head of planning at RCREEE. Zaber introduced the presenters of policies and tools that can be used to promoting local employment and value creation. Steffen Erdle, from GIZ's regional RE-ACTIVATE project, presented international good practices for employment through sustainable energy and Joseph Al Assad, from the Lebanese Center for Energy Conservation (LCEC),



discussed policies in support of renewable energy in Lebanon

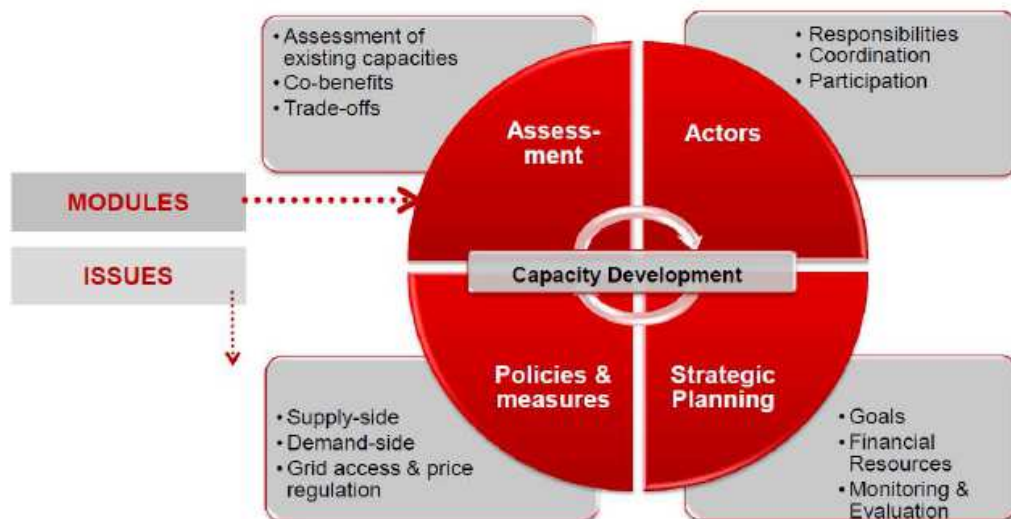
International Good Practices for Employment through Sustainable Energy: The SE4Jobs Project, Steffen Erdle, GIZ-RE-ACTIVATE

Erdle started by briefly presenting the GIZ Project RE-ACTIVATE, an interregional and cross-sectoral project focusing on the nexus between sustainable energy (both renewable energy and energy efficiency) and socio-economic development (focusing on local jobs and value creation). Erdle said that the project aims at supporting market development, knowhow transfer, and strategy building for employment-intensive applications at the regional (MENA) level with a focus on three countries: Morocco, Tunisia and Egypt. The project has a duration of 4 years (2014 – 2017) and a budget of EUR 5 million.

Erdle then moved on to outline some key results of SE4JOBS, a key activity of RE-ACTIVATE which was launched in 2014 by 6 GIZ Projects as an expert group and work platform dealing with the linkages between sustainable energy and socio-economic development. The activity is supported by experts from adelphi and FFU and it has so far benefited from the organization of 6 in-house and in-country workshops and trainings. The objectives of SE4JOBS are to help examine and exploit the many forward and backward linkages between renewable energy/energy efficiency deployment and local socio-economic development, focusing on the optimization of employment and value creation. This can be done by identifying and analysing worldwide “good practices” and success models, especially in developing and emerging countries; distinguishing key variables and causal relationships that explain best the trajectories and results of the reference cases; and translating these insights into new, customized tools and formats for technical assistance and capacity building such as a new SE4JOBS Toolkit, SE4JOBS Good Practice Studies, and SE4JOBS Training Module which are to be finalized soon and will be made available online.

Erdle presented the policy cycle approach of SE4JOBS below along with some of the key results and recommendations.





He stated that renewable energy/energy efficiency deployment and associated manufacturing and ancillary services are quickly shifting from OECD to developing and emerging countries. Some of the latter have gained a key position in these new markets and generate strong socio-economic benefits for their populations. The lion's share of new local value and job creation is however still heavily concentrated in a relatively small number of countries. At the same time, these new renewable energy/energy efficiency tigers feature very different framework conditions and pursue very different approaches. The number and range of experiences and approaches that have proven successful and can serve as examples has strongly increased. Erdle emphasised that although there is neither a silver bullet nor a one size fits all solution, some recurring issues have proven crucial and should be considered. Only functioning domestic markets trigger the necessary investment. These depend on sound framework conditions and adapted support instruments that stimulate market actors and correct market failures. A critical mass of local stakeholders must be involved and support the process. These must have the capacities to organize and implement a large-scale, cost-effective, reliable and adapted deployment of renewable energy/energy efficiency. Successful approaches are strongly contextualized. Key elements are: strategy, commitment, implementation capacities, capacity building. He added that functioning markets require sound policy frameworks. Policies are needed to organize the investment-driven renewable energy/energy efficiency roll-out and provide for the necessary system integration and stakeholder inclusion. Ideally, he said, these policies are based on a strategy that connects the potentials and preferences of a society, organizes a roll-out pathway, and mobilizes the needed political, financial and technical support. Identifying and communicating socio-economic co-benefits for local populations is key to foster social acceptance and political support. Recognizing and addressing trade-offs and conflicting interests and objectives is also key for designing the right strategies and policies.

Erdle explained that a larger participation of the local workforce and business community is crucial for stepping up the pace and scope of renewable energy/energy efficiency deployment,



while bringing down delays and costs linked to it. Actual or prospective local economic actors (investors, developers, manufacturers, service providers, off-takers...) should be pro-actively supported in correctly identifying and capturing market niches. Market segments which exhibit comparatively low entry barriers and offer over-average employment effects should be specifically focused. Also, tried-and-tested instruments from other policy fields, like local supplier development and business linkage programs, can be used. Erdle added that good support instruments incentivize renewable energy/energy efficiency investments in a non-discriminatory and cost-effective way: they strike a balance between both demand and supply support; target key market failures (awareness, externalities/freeriding, coordination problems) and those groups with the greatest potential; help businesses to become competitive and deliver quality; and limit rents in time/scope and base them on performance.

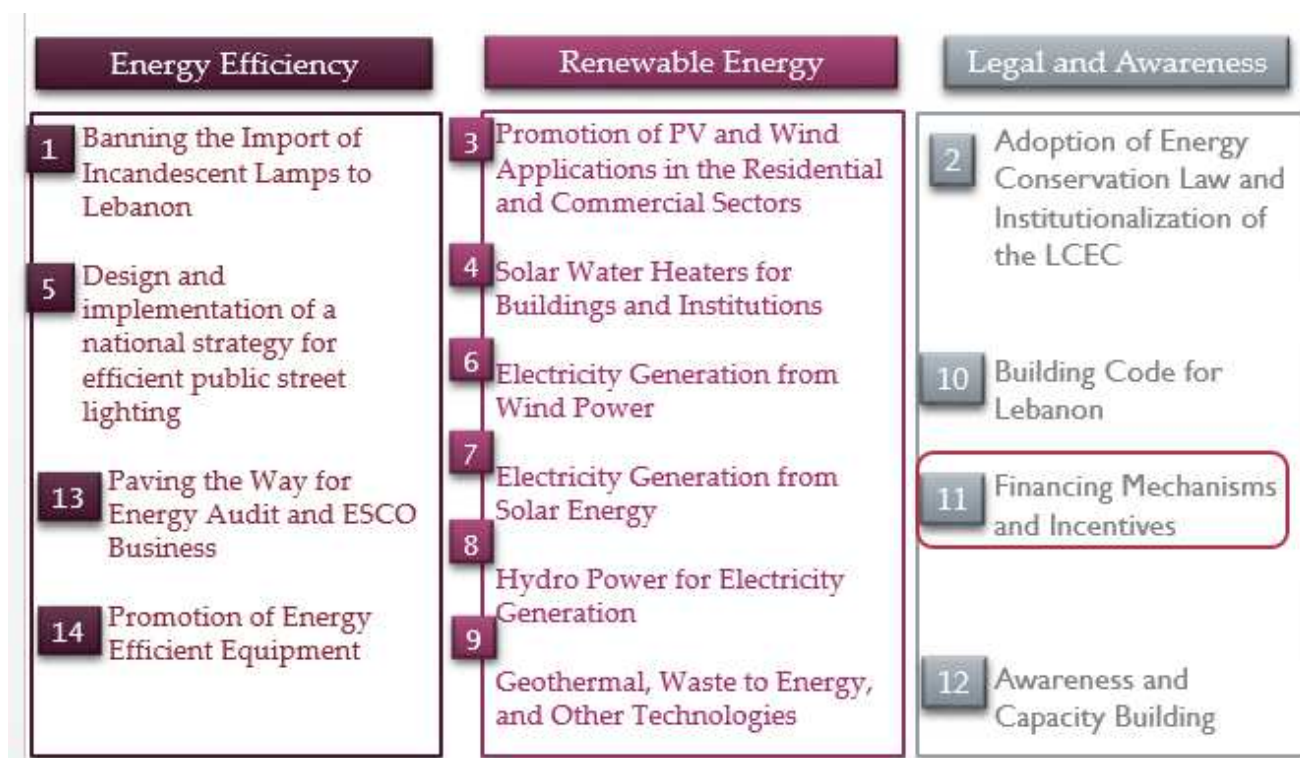
Erdle said that the larger the share and the greater the role of local actors, the more important become the notions of performance and quality and the need for the state to pro-actively support and secure them. Therefore, skill and capacity building at both individual and institutional levels are particularly crucial: performance gaps need to be overcome, and quality issues need to be resolved, so that the necessary longevity and profitability of the installations can be guaranteed. As such, a clear priority should be given to human capital development: this should include encouraging cooperation between education and business at both academic and TVET levels, including through enhanced applied research and life-long learning, establish labour market-adjusted and internationally compatible training standards and practices, while always considering the informal sector.

He concluded by reminding that employment effects of renewable energy/energy efficiency applications vary strongly: depending on the technology and the size of the project; differing in terms of the duration and the location of the effect; differing in terms of the kind of inputs and the level of skills required. To become sustainable, they crucially depend on whether the country has created a functioning domestic market, set up an enabling and risk-minimizing policy framework, and developed the necessary technology and process knowledge.

After all, successful countries share certain features: they develop strategic approaches to their renewable energy/energy efficiency goals, based on an assessment of their status quo and future potentials; they mobilize state and non-state actors and stakeholders; they implement policies to develop markets and create jobs; they invest in HR development and capacity building to accompany the development of markets and employment. By virtue of all of this, they enable a co-evolution of policies, markets and technological capacities with strong benefits for local employment and value creation.

#### Socio-economic impacts of renewable energy in Lebanon, Joseph Al Assad, LCEE

Al Assad introduced the first National Energy Efficiency Action Plan (NEEAP) for Lebanon that was adopted by the Council of Ministers of Lebanon on 10 November 2011. It includes 14 initiatives that tackle energy efficiency and renewable energy shown below:



Al Assad explained that for the period between 2016 and 2020, the NEEAP split into two separate dedicated initiatives, one for renewable energy (NREAP) and another for energy efficiency (NEEAP). The development of the NREAP took the following into consideration the international outlook toward renewable energy and the assessment of resource potential in the country. As a result, target scenarios and trajectories were drawn, out of which an assessment of economics and socio-economic impacts were made.

Al Assad explained that the National Energy Efficiency and Renewable Energy Action (NEEREA) includes financing energy efficiency and renewable projects all over Lebanon whereby Lebanese commercial banks offer both technical and financial support; subsidized interest rates of 0.6% and long repayment period of 14 years. NEEREA has so far achieved more than USD 295 million granted loans and 402 projects by the end of November 2015. 19 projects have so far profited from the EU grant and more than 20 banks are involved with around 74 companies implementing projects. The reach out has extended to several sectors including residential, industrial, and educational.

Al Assad then explained the expected impact of the implementation of the NREAP on job creation opportunities based on IRENA reports, focusing on PV because of data availability. He explained that out of the 74 companies profiting from NEEREA, 52 companies working on PV projects. There are 226 projects of total capacity around 9.8 MWp and around 15 GWh of production with USD 14.7 million investment needed. As such, the cost is estimated at USD/MWp 1.5 million or 0.98 USD/kWh (including backup in most cases). In order to assess the socio-economic impacts of such development, a questionnaire was run covering the companies' year of establishment and the needed administrative and technical jobs. Out of the 74

companies surveyed, 52 replied, out of which 50 are working on PV projects. The results of the study indicate that there are 654 job opportunities created: 67 opportunities per MW of installations out of which 47 are technical and 20 are administrative.

Al Assad concluded that realizing the set target for PV installations in NREAP for 2020 (200-300 MW of installations) and considering that technical opportunities will have a linear expansion for new installation, between 8,930 to 13,630 technical opportunities are expected to be created with a 285 to 435 Million USD market.

#### Panel discussion on the socio-economic impacts of various renewable energy plans

Following the presentations that set the scene for the discussion, Jaber invited the panellists (consisting in equal shares of public and private sector representatives from MENA and non-MENA countries) to present their views on the various policies or government actions that can contribute to maximising the socio-economic benefits at the country level.



Mohamed El Sobki, from the New and Renewable Energy Agency (NREA) of Egypt, explained that his country's plan to introduce 750 MW of solar PV is expected to generate 3 jobs/MW in the construction of the projects, and 1.6 jobs/MW of permanent jobs including 0.7 jobs/MW for O&M. Sobki added that the country is targeting 8 GW in the next phase. He also said that a SWH programme was implemented but with not much success as there were not enough certified installers. Moreover, Sobki added that 20-25% local content has been reached in wind projects.

Al Assad from Lebanon explained that his country is now setting up a certification program for the installation of PV panels. It will be the first in the region and will help ensure the skills required for the technical jobs that are expected to be created with the implementation of NEEREA.

Ayanda Belinda Nakedi, from Eskom Renewables in South Africa, discussed the criteria for selection of projects bid used in the framework of the South African Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Socio-economic benefits from renewable energy deployment are maximised through the use of weighted development criteria during bid evaluation. Job creation and local content, for instance, both have a 25% weight while local ownership and community empowerment each have a 15% weight. Other criteria include preferential procurement (10%), management control (5%) and enterprise development (5%).

Participants from the private sector then presented their views in this regard, and their contribution to the discussion was instrumental in better understanding the policies needed to support the industry. Raed Bkayrat from First Solar discussed the drivers of market growth in the region. He said that the main driver for the private sector is the maximization of profits.

Bkayrat stated that the 13 MW installed capacity of PV in the UAE currently require 6 people for daily cleaning which he said is the only permanent O&M job. Once the 200 MW solar park is up, automation will be needed in order to minimize costs, therefore limiting job creation. Semi-automation may be the way to go. Looking forward, Bkaryat stated that the government's commitment to a future market (in terms of number of projects not only installed capacity) can send a strong signal to the private sector.

Bruce Douglas, from the Global Solar Council, added that 86% of the employment is in the downstream industry, of which 34% are in installation and 24% in O&M. Therefore, job creation does not necessarily take place in manufacturing. Government policy needs to be targeted at building local capacity and strengthening firm capabilities before implementing local content requirements to make sure the quality of products is not compromised and delays do not occur.

Emad Ghaly, from Siemens, presented the view of the wind industry. He said that logistical challenges can make local manufacturing of bulky components more attractive.

### Session 3 Renewable Energy Benefits: Impact on Livelihoods

The third session on *Renewable Energy Benefits: Impact on Livelihoods* was moderated by Steffen Erdle from GIZ who invited Dagmar Zwebe from SNV and Silvia Escudero from EUEI PDF to set the scene for the discussion on *Improving livelihoods through decentralized renewable energy*.

#### Switch to Renewable Energy, Dagmar Zwebe, SNV

Zwebe opened with introducing SNV, an organisation that works to end poverty in 38 countries by tackling issues related to renewable energy, water and sanitation, hygiene and agriculture. Zwebe highlighted the role of sustainable energy markets in improving livelihoods through improved education and health, reduced poverty and environmental impacts and increased gender equality.

Zwebe then described the SNV Domestic Biogas Programme that was nominated for the Zayed Future Energy Prize. The programme has contributed to the development of the biogas (and manure) sector in 20 countries with over 660,000 biodigesters installed. The programme has introduced many socio-economic benefits including access to energy to over 3.3 million people, improved health and sanitation from the waste management of manure produced in pig farms, contribution to agriculture and food security through the production of fertilizers, reduction of emissions, in addition to the economic benefits including local value and job creation.

In Vietnam, the programme has led to the creation of more than 1000 active micro enterprises, with an average of 774 direct full time employment annually and an additional 300 indirect jobs. Trained masons earn approximately 90% more, untrained assistants around 45% more



than the average GDP/capita of USD 1,028 in the same year. Zwebe highlighted other economic benefits realised such as income savings and generation: actual fuel savings in 2013 amounted to 54 USD/household annually. A reduced electricity consumption of 69.62 kWh/year was reported per household and the use of bioslurry led to savings of replaced chemical fertiliser of USD 22.6 per year. As a result, she stated, each household saves USD 175 per year if the market prices for fuel are considered and USD 63.6 per year if the actual expenditures on fuel savings are calculated.

Zwebe also highlighted some of the important social benefits. The time savings for women that are involved in activities such as collection of firewood and cooking in 2013 was on average 1.49 hours: 0.69 hours/day on cooking, 0.42 hours/day on manure collection and 0.23 hours/day on wood and agricultural residue collection. Therefore, the presence of a biogas digester results in annual saving of 543.85 hours per family, equivalent to 30% of average full time job. As a result, it was reported that 44% of men spend the saved time on farm-related activities, 15% on income-related activities outside the farm and 36% on leisure time. As for women, 35% spend the saved time on farm-related activities, 3% on income-related activities outside the farm, 26% on cleaning the house, 16% taking care of children and 19% on leisure time.

Health benefits reported include significant reduction in diseases related to indoor air pollution. Environmental benefits include cleaner environment, reduced deforestation, prevention of groundwater pollution, and reduction in greenhouse gas emissions.

#### EU Energy Initiative Partnership Dialogue Facility (EUEI-PDF), Silvia Escudero, EUEI-PDF

Escuerdo started by introducing EUEI-PDF. It was created in 2004 as an instrument of the EU Energy Initiative. It supports the creation of an enabling environment for investments in sustainable energy markets. Over the last 10 years, there were more than 81 activities supported in 21 countries and 7 regions.

Core themes include energy access, renewable energy and energy efficiency. More recently, the programme has been involved in climate change and energy in cities. Mainstreaming elements include gender equality, private sector and market development, productive use and job creation and the nexus between water energy and food. Escuerdo highlighted the strategy energy advisory and dialogue services provided including those related to policy, strategy and regulation, institution building and strengthening, capacity building and knowledge sharing, as per the figure below. Some of the partner organisations involved include the World Bank / Africa Electrification Initiative & Club-ER working on *Low Cost Grid Electrification Technologies*, GIZ on *Biomass Energy Sector Planning Guide*, REN21 & Alliance for Rural Electrification on *Mini-grid Policy Toolkit* and Practical Action on *Building Energy Access Markets*.



### Strategy Energy Advisory and Dialogue Services (SEADS)

#### Policy, Strategy & Regulation

- **Advisory services** for developing **energy policies, regulations, laws, strategies, etc.**

#### Institution Building & Strengthening

- **Support** for establishment / strengthening of **energy specific institutions** (RE Center etc. )

#### Capacity Building

- Development of **knowledge and skills** (trainings, workshops etc.)

#### Knowledge Sharing

- **Thematic studies** and **dialogue events**

Escuerdo introduced the project on the *Productive Use of Energy (PRODUSE)* that aims to gain insights into the interaction between energy access and productive activities; improve the toolkit for evaluation of energy projects with focus on local economic development and provide practical guidance on how to promote the productive use of energy. The study on *Measuring Impacts of Electrification Projects* examines the usage of electricity in micro-enterprises its effects on the performance of firms and develops and tests a methodology for the evaluation of the productive use impacts of electrification programmes. In addition, the manual on *Implementation Tools for Electrification Practitioners* offers step-by-step guidance for designing and implementing activities to promote the productive use of energy. It is structured according to a generic project cycle covering each phase from initial planning to the implementation and evaluation of projects. It provides a description of the practical tasks to be conducted, as well as references or links to publicly available tools.

The presentation was followed by an intervention from Divyam Nagpal from IRENA on the use of off-grid applications in the agriculture sector. Dagpal highlighted that around 2.5 billion people rely on agriculture for livelihood. Therefore, increasing growth in the agriculture sector is widely known to be the most effective way to fight poverty and stimulate socio-economic development. A fundamental way of increasing productivity in the sector is to increase access to more reliable and cost-effective energy in the sector. Already the food sector accounts for 30% of total primary energy consumption globally, yet access to modern energy services remains limited especially in many developing countries. Nagpal explained that increasing access could have a transformative impact on livelihoods for millions of rural communities





relying on agriculture.

It could reduce the cost of inputs, improve yields and quality, reduce losses, and increase overall income and welfare, thereby contributing to several of the Sustainable Development Goals. Decentralised renewable energy technologies are well-suited for meeting these energy demands in an affordable, reliable and environmentally-sustainable manner. The interlinkages between renewable energy and the agriculture sector were examined in IRENA's report *Renewable energy in the water, energy and food nexus* which was launched last year. It found that along the different segments of the agri-food chain, several renewable energy options are available to cater to demands for electricity, heating/cooling, motive power as well as transport fuel.

In the pre-harvesting stage, Nagpal explained, renewables-based pumping could displace fossil-fuels and expand irrigation services in rural areas. Renewables can also be used in post-harvesting activities for food processing (e.g. milling and pressing), and preservation (e.g. drying and refrigeration). He said that to better understand the opportunity for renewables deployment and the socio-economic benefits they offer, IRENA is undertaking in-depth analysis of specific applications, such as the use of renewable energy for water pumping for irrigation.

The use of renewable energy to power water pumps for irrigation has gained substantial prominence of-late and rightly so. Compared to rainfed agriculture, irrigation offers multiple benefits in terms of: greater productivity (almost twice as much as compared to rainfed); opportunities for double or triple cropping practices; reduction in vulnerability to rainfall patterns (in the face of a changing climate); and improvements in incomes, livelihoods and reduced hardship from hauling water over long distance. However, Dagpal warned about the interlinkages between energy, water and food, and warned that increased access to cost-effective energy can lead to over pumping which can result in drying aquifers.

The session ended with interventions from the participants on issues such as gender and broader development. This lead to the end of the workshop with closing remarks from Ferroukhi and Erdle thanking the participants and reiterating the importance of the mix of policies tailored to the specific country conditions in order to maximise the socio-economic benefits of renewable energy deployment.

## Agenda

13:45 - 14:00	<b>Welcome Coffee</b>	
14:00 - 14:30	<b>Welcome and Introductory Remarks</b> Rabia Ferroukhi, IRENA and Steffen Erdle, GIZ	
<b>Session 1</b>  14:30 – 15:30	<b>Benefits of Renewable Energy: Measuring the Economics</b> Moderated by Rabia Ferroukhi, IRENA <i>Setting the scene: Measuring renewable energy benefits, Alvaro Lopez-Peña, IRENA</i> <i>Renewable energy jobs, Arslan Khalid, IRENA</i>	
	Open Discussion	<ul style="list-style-type: none"> <li>- How do the results compare with other studies?</li> <li>- What is the value added of the study carried out by IRENA?</li> <li>- What are the economic variables that affect the model most? And how were these addressed?</li> <li>- What are the implications for policy-makers?</li> </ul>
<b>Session 2</b>  15:30 – 16:30	<b>Benefits of Renewable Energy: Options for Maximising Local Value and Employment</b> Moderated by Ziad Jaber, RCREEE <i>Setting the scene: Promoting local employment and value creation - tools and policies:</i> <ul style="list-style-type: none"> <li>- <i>International Good Practices for Employment through Sustainable Energy: The SE4Jobs Project- Steffen Erdle, GIZ-RE-ACTIVATE</i></li> <li>- <i>Socio-economic impacts of renewable energy in Lebanon – Joseph Al Assad, LCEC</i></li> </ul>	
	Panel Discussion	Insights from the field and feedback from practitioners: the public sector <ul style="list-style-type: none"> <li>- Mohamed El Sobki, New and Renewable Energy Agency (NREA), Egypt</li> <li>- Joseph Al Assad, Lebanese Center for Energy Conservation (LCEC) Lebanon</li> <li>- Ayanda Belinda Nakedi, Eskom Renewables, South Africa</li> </ul> Insights from the field and feedback from practitioners: the private sector <ul style="list-style-type: none"> <li>- Raed Bkayrat, First Solar</li> <li>- Bruce Douglas, Global Solar Council</li> <li>- Emad Ghaly, Siemens</li> </ul>
	Q&A Session	
16:30 - 17:00	<b>Coffee Break</b>	
<b>Session 3</b>  17:00 – 18:00	<b>Renewable Energy Benefits: Impact on Livelihoods</b> Moderated by Steffen Erdle, GIZ <i>Setting the scene: Improving livelihoods through decentralized renewable energy, Dagmar Zwebe, SNV</i>	
	Panel Discussion	Dagmar Zwebe, SNV Silvia Escudero, EUEI PDF Divyam Nagpal, IRENA
	Q&A Session	
18:00	<b>Concluding Remarks</b> Rabia Ferroukhi, IRENA and Steffen Erdle, GIZ	